NASA TECH BRIEF

NASA Pasadena Office

Digital Data Command Bus

The problem:

To reduce the number of wire pairs required to communicate command data to systems and subsystems.

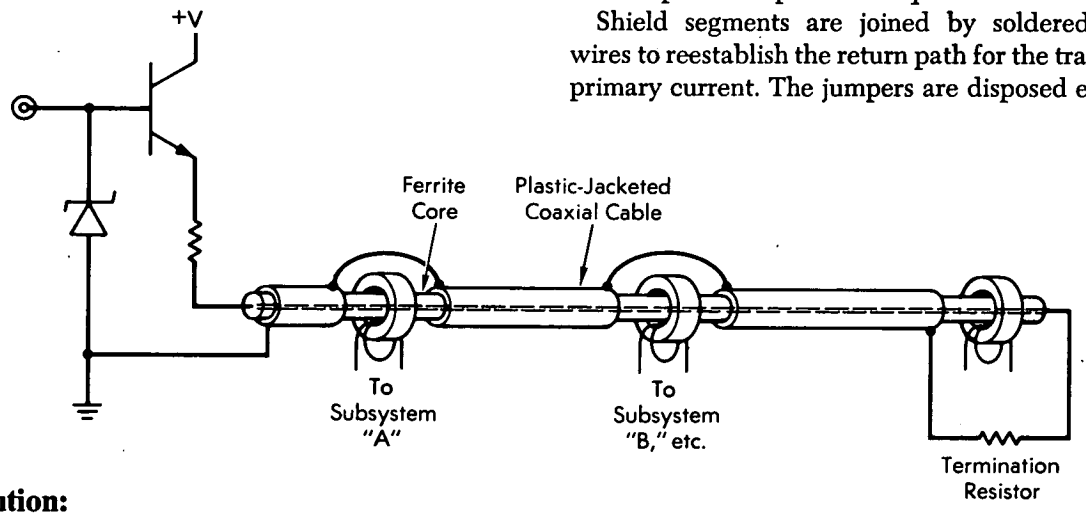
The solution:

A command bus constructed from a coaxial cable that has short segments of its outer jacket and shield removed and replaced with small ferrite cores carrying multiturn windings connected to a decoder.

How it's done:

The diagram is a schematic representation of the way a coaxial cable, consisting of a central conductor and outer metallic shield separated by an insulating layer, is divided into segments by removal of the outer jacket and shield; the inner insulator is allowed to remain intact and linear ferrite cores are stationed at the open segments. A multiturn winding is disposed about the limb of the core as shown to form the secondary winding of a transformer; the central conductor of the coaxial cable performs as a single-turn primary for the ferrite core transformer. The winding may have as many turns as required to match specific impedance requirements.

Shield segments are joined by soldered jumper wires to reestablish the return path for the transformer primary current. The jumpers are disposed externally to the cores so that shield current does not pass through the cores to affect transformer action. Alternatively, the shield current may be passed through the cores in reverse direction to enhance or aid the action of the primary current. The bus is excited by the constant voltage source (current driver) to transfer pulses at about a 10-volt level to each of the secondary windings. Typically, a signal of about 2 volts is developed when the secondary winding is appropriately loaded.



The number of cores and windings placed on the bus corresponds to the number of systems and subsystems to be commanded. Each bus is terminated in

(continued overleaf)

its own characteristic impedance. If a parallel-bit decoding scheme is used, as many command buses would be required as there are bits in each command word. Thus, if each word were made up of four bits, four buses would be required. The secondary winding from each command bus would be connected to the appropriate input of each individual decoder for the particular system or subsystem.

Notes:

1. Performance and the effects of minor modifications have been checked on experimental models.
2. Applications are suggested as a communication interface between not too distantly separated digital equipments and systems and as a means of minimizing some of the problems in computer interfacing.
3. Requests for further information may be directed to:

   Technology Utilization Officer
   NASA Pasadena Office
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: TSP 73-10035

Patent status:

NASA has decided not to apply for a patent.

Source: George C. Milligan of
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